WBS 2.4 Change Request #54, Summary and Justification

September 11, 2000
D. Ayres

This Change Request brings the MINOS cost and schedule plan for WBS 2.4 into agreement with current planning for the far detector installation process. The following types of cost and schedule changes are included:

a. Changes resulting from more detailed engineering designs and planning.
b. Changes required by the detailed cavern outfitting plan that now exists.
c. The cost of items or tasks that were previously omitted by mistake.
d. The cost of Lab operations items moved to WBS 3.4 and to the (new) Soudan Operating Budget.
e. Changes required by recent schedule changes.
f. Addition of more trackable milestones during detector assembly.

There are no WBS 2.4 costs after the completion of the second supermodule in June 2003. MINOS operating funds, which will be covered under the new Soudan Operating Budget (to be established by FNAL PPD), will cover MINOS experiment costs after that time.

This CR increases the estimated total burdened cost for WBS 2.4 by $760k. The CR delays the scheduled date for completion of the MINOS far detector installation from February 20, 2003 to June 13, 2003. The new schedule still meets all Level 2 and Level 3 DOE milestone dates for WBS 2.4.

The following is a summary of the most important changes:

1. WBS 2.4 task structure. The very detailed description of separate installation tasks and associated resources in the baseline Microsoft Project file has been replaced by a much smaller number of rolled-up tasks. This provides a continuous, smooth minecrew effort profile that does not change when the detailed installation procedures change. The resulting minecrew effort cost estimate, which accounts for nearly 90% of the WBS 2.4 cost, is more realistic and much less complicated to maintain. A separate Microsoft Project project file is used to plan detailed minecrew effort assignments for specific tasks.

2. Schedule changes and additions:
   a. Delayed start of underground outfitting contract work: 11/15/00
   b. Added beneficial occupancy date for the Surface Building: 01/02/01
   c. Added beneficial occupancy date for Soudan Hall Mezzanine: 01/15/01
   d. Delayed beneficial occupancy date for MINOS Cavern: 05/01/01

e. Updated schedules for infrastructure setup, detector assembly, etc.

3. Several Lab operating M&S costs have been moved from WBS 2.4 to WBS 3.4 or to the new Soudan Operating Budget:

Task moved to Lab Operating Budget	Burdened baseline cost
Minecrew travel	$19k
Office & shop equipment	$86k
Surface materials handling equip.	$50k
Communications (LAN)	$16k

Reduction from WBS 2.4 baseline	$171k

4. Minecrew effort. A realistic minecrew effort profile during the ramp-up period (January to September, 2001) is now implemented and more realistic salaries for minecrew workers are used. In addition, the SWF costs for three (out of the original 39) MINOS minecrew members have been moved from WBS 2.4 to Lab Operations (WBS 3.4 and the new Soudan Operating Budget). The major contributors to the cost increase for minecrew effort are increased effort for infrastructure setup tasks (see note 7 below) and increased salary and fringe benefit costs.

Baseline minecrew	SWF	Update	Delta
	$4,037k	$4,514k	$477k

5. Overhead cost changes. The baseline cost estimate used 0% U. of Minnesota overhead on all M&S costs. The correct 26% rate is now used for all M&S costs (and minecrew SWF costs, as before) except capital equipment (0% overhead) and payments to the DNR (5% overhead, compared to baseline 26% on DNR SWF). In addition, funds spent by the University of Minnesota are no longer subject to any Fermilab overhead charges because they are provided using a direct financial plan transfer. The largest changes in overhead costs are:

Overhead cost	Baseline	Update	Delta
U of Minn OH on M&S	$31k	$117k	$86k
FNAL OH on Soudan funds	$57k	0	-$57k
U of Minn OH on DNR costs	$71k	$ 34k	-$37k
	-----	------	-----
Total	$159k	$151k	-$ 8k

6. DNR costs. DNR charges for operating the shaft hoist have been updated and the number of hoistman/maintenance personnel hours have increased to a more realistic level during supermodule installation. The largest cost increase comes from more than doubling the number of hoist trips per supermodule to include moving detector components other than steel plates

and scintillator modules. In addition, the cost of occasional use of DNR personnel to assist with MINOS installation work has been included.

DNR cost	Baseline	Update	Delta
Per-trip hoist charges	$132k	$320k	$188k
Hoistman effort	$388k	$442k	$ 54k
Other DNR effort	0	$ 28k	$ 28k
Total	$520k	$790k	$270k

7. Infrastructure setup costs. The new cost estimate for the setup of laboratory infrastructure systems (new WBS 2.4.4) is based on the cavern and detector outfitting contract (now signed) and the detailed plan for remaining work to be performed by the minecrew:

	Baseline	Update	Delta
M&S	$47k	$223k	$176k
SWF	$89k	$208k	$119k
	$136k	$431k	$295k

(Note: SWF listed here is also included in item 4 above)

Most of the M&S cost increase is for items that were erroneously omitted from the baseline cost estimate. The most important items are:

Item	Burdened cost
Rigging equipment not included in WBS 2.1	$34k
Scintillator module test & storage equipment	$69k
Control room, relay racks, cable trays (M&S)	$61k
Total	$164k